

## Claims

What is claimed is:

1. A method for making silica, comprising:  
delivering a silica precursor comprising a perfluorinated group to a conversion  
site; and  
5 passing the silica precursor through a conversion flame to produce silica soot.
2. The method of claim 1, wherein the perfluorinated group selected from a group  
consisting of alkyl, alkenyl, alkoxy, and aryl.
3. The method of claim 1, wherein the silica precursor is represented by the general  
10 formula  $\text{Si}(\text{OR}_F)_x\text{F}_{4-x}$ , where  $\text{R}_F$  represents the perfluorinated group and  $x$  is an  
integer ranging from 1 to 4.
4. The method of claim 1, wherein the silica precursor further comprises at least one  
substituent selected from a group consisting of fluorine and chlorine.
5. The method of claim 1, wherein the silica precursor is represented by the general  
15 formula  $\text{SiCl}_x\text{F}_y(\text{R}_F)_z$ , where  $x$ ,  $y$ , and  $z$  are integers, the sum of  $x$ ,  $y$ , and  $z$  is equal  
to 4, and  $\text{R}_F$  represents the perfluorinated group.
6. The method of claim 5, wherein  $\text{R}_F$  comprises at least one substituent selected from  
a group consisting of chlorine and fluorine.
7. The method of claim 5, wherein the perfluorinated group comprises a group  
selected from a group consisting of alkyl, alkenyl, alkoxy, and aryl.
- 20 8. The method of claim 1, wherein the silica precursor is represented by the general  
formula  $\text{Si}(\text{R}_F)_x\text{F}_{4-x}$ , where  $\text{R}_F$  represents the perfluorinated group and  $x$  is an  
integer ranging from 1 to 4.
9. The method of claim 8, wherein the perfluorinated group comprises a group  
selected from a group consisting of alkyl, alkenyl, alkoxy, and aryl.

10. The method of claim 1, wherein the silica precursor is delivered to the conversion site in vapor form.
11. The method of claim 10, wherein the silica precursor is delivered to the conversion site in a gas stream comprising an inert gas.
- 5 12. The method of claim 1, wherein a fuel combusted to produce the flame comprises one selected from a group consisting of CO, (CN)<sub>2</sub>, (NCO)<sub>2</sub>, and combinations thereof.
- 10 13. The method of claim 1, further comprising delivering to the conversion site a compound capable of being converted to an oxide of at least one member of a group consisting of B, Al, Ge, Sn, Ti, P, Se, Er, S, Ca, Ba, Y, Yb, Ta, La, Sb, and Bi.
14. The method of claim 1, further comprising depositing the silica soot on a deposition surface.
15. The method of claim 14, further comprising consolidating the silica soot into glass.
- 15 16. The method of claim 15, wherein the deposition surface is provided by a rotating mandrel.
17. The method of claim 16, further comprising drawing the glass into a core cane.
18. The method of claim 14, wherein depositing the silica soot on a deposition surface comprises simultaneously consolidating the silica soot into glass.
19. A method for making fused silica, comprising:
- 20     delivering a silica precursor comprising a perfluorinated group to a conversion site;
- passing the silica precursor through a conversion flame to produce silica soot; and
- 25     depositing the silica soot onto a deposition surface, wherein the silica soot is immediately consolidated into glass.
20. The method of claim 19, wherein the perfluorinated group is selected from the group consisting of alkyl, alkenyl, alkoxy, and aryl.

21. The method of claim 19, wherein the silica precursor is represented by the general formula  $\text{Si}(\text{OR}_F)_x\text{F}_{4-x}$ , where  $\text{R}_F$  represents the perfluorinated group and  $x$  is an integer ranging from 1 to 4.

5 22. The method of claim 19, wherein the silica precursor further comprises at least one substituent selected from a group consisting of fluorine and chlorine.

23. The method of claim 19, wherein the silica precursor is represented by the general formula  $\text{SiCl}_x\text{F}_y(\text{R}_F)_z$ , where  $x$ ,  $y$ , and  $z$  are integers, the sum of  $x$ ,  $y$ , and  $z$  is equal to 4, and  $\text{R}_F$  represents the perfluorinated group.

10 24. The method of claim 23, wherein  $\text{R}_F$  comprises at least one substituent selected from a group consisting of chlorine and fluorine.

25. The method of claim 23, wherein the perfluorinated group comprises a group selected from a group consisting of alkyl, alkenyl, alkoxy, and aryl.

15 26. The method of claim 19, wherein the silica precursor is represented by the general formula  $\text{Si}(\text{R}_F)_x\text{F}_{4-x}$ , where  $\text{R}_F$  represents the perfluorinated group and  $x$  is an integer ranging from 1 to 4.

27. The method of claim 26, wherein the perfluorinated group comprises a group selected from a group consisting of alkyl, alkenyl, alkoxy, and aryl.

20 28. The method of claim 19, wherein a fuel combusted to produce the flame comprises one selected from a group consisting of  $\text{CO}$ ,  $(\text{CN})_2$ ,  $(\text{NCO})_2$ , and combinations thereof.

29. A method for making silica, comprising:

delivering a silica precursor comprising a chloro-derivative to a conversion site;  
and

passing the silica precursor through a flame to produce silica soot.

25 30. The method of claim 29, wherein the silica precursor further comprises a fluoro-derivative.

31. The method of claim 29, wherein the silica precursor comprising a chloro-derivative which has the formula selected from a group of  $S_I(R_F)_4$  and  $S_I(OR_F)_4$ .
32. The method of claim 31 wherein  $R_F$  is selected from a group consisting of  $CF_3$ ,  $CClF_2$ ,  $CCl_2F$ ,  $CCl_3$  and  $C_2F_5$ .
- 5     ~~33.~~ A method for making silica, comprising:
- delivering a silica precursor comprising a fluoro-derivative to a conversion site;
  - and
  - passing the silica precursor through a flame to produce silica soot.